REMARKS

Applicant's attorney wishes to thank Examiner Koslow for the courtesies extended during the telephone interviews of January 29 and February 10, 2004.

Claims 32-59 and 64-68 currently appear in this application. The Office Action of September 16, 2003, has been carefully studied. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicants respectfully request favorable reconsideration, entry of the present amendment, and formal allowance of the claims, as no new issues are presented.

Allowable Subject Matter

Claim 59 is merely objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

It is respectfully submitted that all of the claims at issue are now allowable, and therefore there is no need to rewrite claim 59.

Art Rejections

Claims 32-56 are allowable over the cited art of record.

Claims 57 and 64 are rejected under 35 U.S.C. 102(b) as being anticipated by Hase et al. The Examiner alleges that Examples 9-14 teach cubic zinc sulfide electroluminophores having an average size of 8 or 9 microns.

This rejection is respectfully traversed. Hase et al. disclose ZnS **phosphors**, not electroluminophores as claimed in the present invention. The phosphors of Hase, et al. are not at all the same as the electroluminophores of the present invention.

Zinc sulfide luminophores are luminescent materials that have been closely examined for a long time. Depending upon the concrete luminescent material composition, on the conditions of preparation of the luminescent material, and other essential factors, these compounds exhibit both upon excitation with ultraviolet and X-radiation or electron beans, intensive florescence and phosphorescence appearances (afterglow) so that they cane be used in various technical devices used in light and display engineering. Under certain conditions ZnS luminescent materials specially configured are also able to convert the energy of electrical fields directly into luminescence radiation. Zinc sulfide materials that are able to do so are called electroluminophores.

For this, the capability of ZnS luminophores to efficiently transform the exciting high energy radiation into

visible light is always related to the presence of certain activators and, in most cases, to the presence of selected coactivators in the ZnS matrix. These are responsible for the radiative recombination of the excited electrons in the basic condition and, in general, they determine the emission spectrum of the luminescent material and therefore the color of the light emitted. The most important activators are silver, copper, and gold, which, in most cases, are included in Zn lattice sites. The coactivators occupy either Zn lattice sites as well or sulfur lattice sites. First of all, these include aluminum and halogens such as chloride, bromide, iodide, and occasionally gallium and indium. In the corresponding chemical formulate, the application of activators and coactivators to the ZnS matrix is usually symbolized as follows:

ZnS:Cu, Al

This means, for example, that copper and aluminum have been used here for doping/codoping purposes of the ZnS base lattice. In certain cases, more than one activator and/or coactivator can be used in the ZnS lattice.

However, the presence of activators and coactivators is sufficient to impart only luminescence in ZnS particles. For the particles to have the ability to electroluminesce, as in the particles claimer herein, it is absolutely necessary to

have further structural elements to make it possible to transform energy. This is the fundamental difference between electroluminescence and other luminescence processes.

In the case of photoluminescence, X-ray luminescence, or cathodoluminescence, the excitation radiation is of high energy and is applied to the luminescent material from external sources. However, in the case of electroluminescence, the excitation radiation is produced in the electroluminescent material itself. This occurs because, when the electroluminescent material is prepared using certain preparative manipulations, namely, steps (c) and (d) in the herein clamed process, there are formed vacancies (dislocation lines) in those treated ZnS crystals by CuxS eliminations (or the corresponding AgxS or AuxS eliminations), which produces so-called CuxS needles. When an electrical field is applied to the electroluminescent crystal, the electrical field is concentrated at the tips of the needles and amplified locally. Then charge carriers (electrons and holes) are mobilized on those p conducting CuxS needles and injected into the ZnS matrix. This charge may be caught by the existing luminescent centers (activators and coactivators) and recombine by emitting luminescence radiation.

This excitation mechanism is known to experts in this field and is generally accepted. For example, it is

described in detail in *Phosphor Handbook*, edited by Shigeo Shionoya and William M. Yen, CRC Press LLC 1999, pages 605-605, copies of which are submitted herewith. It is well known and accepted that those CuxS or AgxS or AuxS eliminations, which are absolutely necessary for the production of efficient electroluminescence, have an adverse effect on other kids of luminescence, such as photo- X-ray- or cathodoluminescence. For example, in the case of a cathode-ray excitation, they would, to a great extent, result in an erasure of the luminescence.

The luminescent materials disclosed by Hase and Marking are not electroluminophores, because, in addition to the selected activators and coactivators, they would also have to have the additional structural elements described above, namely, CuxS, AgxS or AuxS. If they exhibited these structural elements, they would no longer be effective night luminescent pigments or CRT luminescence materials. Therefore, neither Hase nor Marking discloses electroluminophores.

Claim 64 depends from allowed claim 32. Claim 32 recites that the zinc sulfide particles are mixed with activator compounds and coactivator compounds. Therefore, claim 64 should be allowable.

Claim 58 is rejected under 103(a) as being unpatentable over Hase et al.

This rejection is respectfully traversed. As discussed above, Hase et al. do not disclose electroluminophores. Even though Hase et al. apply protective layers to zinc sulfide particles, these zinc sulfide particles are not the same as the zinc sulfide particles claimed herein, as the Hase et al. compounds are phosphors rather than electroluminophores. If the Hase et al. particles were electroluminophores, they would not function as phosphors. Moreover, claim 58 depends from claim 56, which is an allowed claim. Since claim 58 further limits claim 456, it is respectfully submitted that claim 58 should also be allowed.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

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